Annals of Clinical and Analytical Medicine
Original Research

Contrary to popular belief; Is placenta accreta spectrum more innocent than uterine atony?

Yunus Emre Purut[1], Fedi Ercan[2], Mehmet Murat İsikalan[3], Selcuk Eren Canakci[4], Niyazi Alper Seyhan[2], Haydar Kaya[5]
[1] Department of Obstetrics and Gynecology, Van Training and Research Hospital, Van
[2] Department of Obstetrics and Gynecology, Faculty of Medicine, Adnan Menderes University, Aydin
[3] Department of Obstetrics and Gynecology, Faculty of Medicine, Adiyaman University, Adiyaman
[4] Department of Emergency, Faculty of Medicine, Adnan Menderes University, Aydin
[5] Department of Obstetrics and Gynecology, Sanliurfa Training and Research Hospital, Sanliurfa, Turkey

Abstract
Aim: Peripartum hysterectomy is characteristically a life-saving process used in cases of massive and unresponsive postpartum haemorrhage. The two most common indications are uterine atony and placenta accreta spectrum. This study aims to compare the demographic characteristics and peripartum results of patients who underwent peripartum hysterectomy due to uterine atony and placenta accreta spectrum.
Material and Methods: This is a retrospective cross-sectional study comparing pregnant women who underwent peripartum hysterectomy for uterine atony and placenta accreta spectrum. At the Sanliurfa Training and Research Hospital, all peripartum hysterectomy cases were researched from patients' files and the hospital's electronic patient information system retrospectively for 9 years from 2010 to 2019.
Results: A total of 127 patients were included in the study, 68 in the uterine atony group and 59 in the placenta accreta spectrum group. Estimated blood loss and excessive blood loss were found to be higher in the uterine atony group (1395 vs 675 ml, $p < 0.001$; 29% vs 13%, $p = 0.014$, respectively). Also, the rate of patients receiving platelet transfusions was significantly higher in the uterine atony group (11 vs 0, $p = 0.001$).
Discussion: Although increasing cesarean rates increase in PAS cases, UA remains the most common cause of PH cases. On the other hand, UA cases may create a more risky clinical situation than PAS patients in terms of the amount of bleeding, the need for blood transfusion and complications that may lead to death, due to their unpredictable nature. The elective management of PAS cases with experienced surgical multidisciplinary teams may cause this.

Keywords
Peripartum Hysterectomy, Placenta Accreta Spectrum, Postpartum Hemorrhage, Uterine Atony

DOI: 10.4328/ACAM.21426 Received: 2022-10-02 Accepted: 2022-10-19 Published Online: 2022-10-19 Printed: 2022-10-20 Ann Clin Anal Med 2022;13(Suppl. 2):S116-120
Corresponding Author: Fedi Ercan, Department of Obstetrics and Gynecology, Faculty of Medicine, Adnan Menderes University, 09010, Aydin, Turkey.
E-mail: fediercan@gmail.com P: +90 505 895 53 09
Corresponding Author ORCID ID: https://orcid.org/0000-0003-2175-5405

Introduction

Peripartum hysterectomy (PH) is characteristically a life-saving process used in cases of massive and unresponsive postpartum hemorrhage. Emergency PH is a procedure performed during delivery or within 24 h after delivery [1]. The incidence of PH has been reported as 0.13 to 5.38 per 1000 deliveries [2]. Uterine atony (UA) and uterine rupture are the most widespread indications of PH in undeveloped countries [3, 4], whereas placenta accreta spectrum (PAS) is the most frequent indication in developed countries. In recent years, abnormal placentation, which is likely related to the increasing rates of caesarean section, has become the most common cause of PH [1, 5].

Despite considerable medical and surgical progress over the years, maternal morbidity or mortality due to postpartum haemorrhage remains an important issue worldwide because of associated complications, which may include massive transfusion and its consequences, intraoperative complications, postoperative morbidity, and even maternal mortality [6, 7]. Patients on whom UA is performed are near-miss cases. However, most of the time, PAS cases are operated on under elective conditions, and therefore obstetricians are aware of what might happen.

This study aims to compare the demographic characteristics and peripartum results of patients who underwent PH due to UA and PAS.

Material and Methods

This retrospective cross-sectional study compared pregnant women who underwent PH for UA and PAS. At the Sanliurfa Training and Research Hospital, all PH cases were retrospectively researched from patients' files and the hospital's electronic patient information system for nine years from 2010 to 2019. Sanliurfa is located in the underdeveloped southeastern Anatolia region of Turkey. According to the Turkey Statistical Institute data, the city with the highest birth rate in Turkey is Sanliurfa (available at: https://tuikweb.tuik.gov.tr/UstMenu.do?metod=temelist). Most of the births in Sanliurfa take place in our hospital. Further, Sanliurfa is the city where the refugee migration that occurred after the Syrian civil war that started in 2011 was the most intense.

Ethical approval for our study was obtained from the Harran University Ethics Committee on 25 July 2019, with the registration code E.31699. The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Pregnant women who underwent PH at the time of delivery (cesarean section or vaginal) or within 24 h after delivery were included. Pregnancies over 24 gestational weeks were enrolled in the study. Pregnant women less than 24 weeks, postpartum hemorrhage developing 24 hours after birth, patients diagnosed with PAS during surgery, patients whose data could not be fully accessed, and PAS patients who were urgently operated on were excluded from the study. The diagnoses of all patients with PAS were histopathologically confirmed. Patients without a histopathological diagnosis were excluded from the study. As a result, two patient groups,the UA group and the PAS group, were formed (Figure 1, the study flowchart).

The ultrasonographic diagnostic standards for PAS are irregular lacunae, a defect of the retroplacental myometrial zone, and turbulent flow. Physical and ultrasound examinations (with Doppler) were performed antenatally by an obstetrician who worked in the obstetrics and gynecology emergency service. A hysterectomy was performed by another operating surgeon. We prepared four units of red blood cell (RBC) suspension and fresh frozen plasma (FFP) for each PAS patient. A vertical incision was performed in patients with known PAS, whereas a Pfannenstiel incision was made for those with UA.

The patients' data included in the study were obtained from electronic records, and any missing data were retrieved from the conventional file archive. Ages, weights, parity, number of previous caesarean sections, gestational age at delivery, pre-and postoperative hemoglobin (Hbg) values, duration of operation, RBC transfusion, FFP transfusion, platelet transfusion, duration of hospital stay, estimated blood loss volume (EBLV), excessive blood loss, and complications of the two groups were compared. From the Hbg results measured 7 days before giving birth, the Hbg values closest to the birth date were accepted as preoperative Hbg. Postoperative control Hbg values were evaluated 24 hours after surgery. Women who had five or more deliveries were defined as grand multipara. Blood transfusion indication was set according to the patient's vital signs, perioperative estimated bleeding amount, intraoperative Hbg levels, or postoperative Hbg level below 7 g/dL. Patients who received a blood transfusion during cesarean section or up to 24 hours postoperatively were considered as "transfusion patients". Patients who were given perioperative or postpartum additional oxytocin, misoprostol, methylergonovine, or carbetocin and who underwent uterine massage were categorised as patients with UA. Hysterectomy was performed in patients who did not respond to these medical treatments and compression sutures in the UA group. Hysterectomy was performed directly in unstable patients who completed their fertility.

EBLV was calculated using a method previously defined by Staffort et al., which utilizes maternal height and weight, as

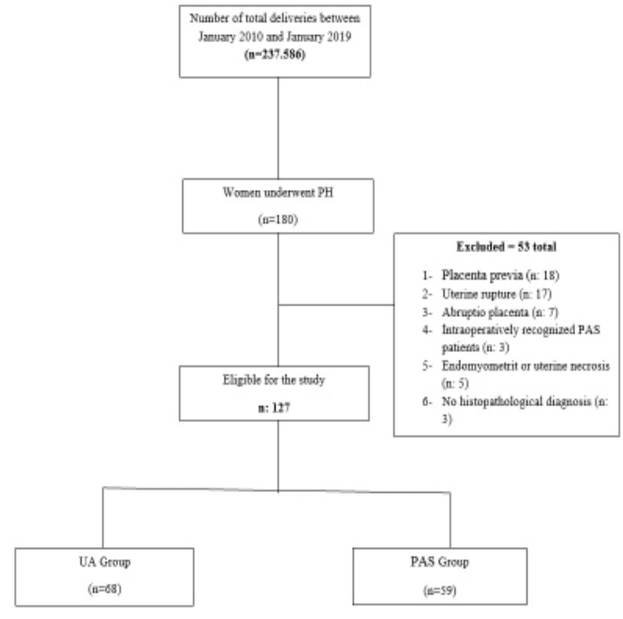

Figure 1. Study flowchart, PAS: Placenta accreata spectrum; PH: peripartum hysterectomy; UA: Uterine Atony

well as preoperative and postoperative haematocrit values [8]. In this calculation, pregnancy blood volume was calculated first (0.75 ([maternal height (inches) × 50] + [maternal weight in pounds × 25]). Then, the percentage of blood volume lost was calculated with the formula: predelivery hematocrit - postdelivery hematocrit)/predelivery hematocrit. EBLV is calculated as: calculated pregnancy blood volume ×percent of blood volume lost. Excessive blood loss was defined as blood loss ≥ 1500 ml within 24 hours after birth [8].

Statistical analysis

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) 16.0 for Windows software program. Descriptive data were rendered as mean ± standard deviation, median (minimum, maximum), or n (%). A p-value < 0.05 was accepted as statistically significant.

The G * Power 3.1 program (Erdfelder, Foul and Buchner, Dusseldorf, Germany) was used for post hoc power analysis. The α error probability, effect size, and power of the study were 0.05, 0.5, and 0.87, respectively.

Results

In the study period, the total number of births was 237,586 at the Sanliurfa Training and Research Hospital. In the same period, 180 PHs were performed. The indications of PHs performed during the study period are shown in Figure 2.

Fifty-three patients who did not meet the inclusion criteria were excluded from the study. A total of 127 patients were included in the study, 68 in the UA group and 59 in the PAS group (flowchart is shown in Figure 1).The mean ages of the women were 33.5 ± 7.2 and 34.0 ± 5.6, respectively. The number of previous cesarean sections was significantly higher in the PAS group (median values 0 vs 2, p <0.001). We observed that delivery occurred in earlier weeks in the PAS group (median values 37.0 vs 39.0 weeks, p <0.001). Other demographic characteristics of the groups are shown in Table 1.

There was no significant difference between the groups in terms of preoperative Hbg values, the need for RBC transfusion, and the duration of the operation. However, postoperative Hbg values were lower in the UA group (9.3 vs. 9.7 g/dL, p = 0.012). Also, EBLV and excessive blood loss were found to be higher in the UA group (1395 vs. 675 ml, p <0.001; 29% vs. 13%, p = 0.014, respectively). In contrast, the rate of patients receiving platelet transfusions was significantly higher in the UA group (11 vs. 0, p = 0.001). The comparison of the UA group and PAS group is shown in Table 2.

Surgical complications occurred in 22 (17.3%) of the patients. There was no significant difference between the total surgical complication rates of the groups. Although DIC was observed more frequently in the UA group (5 vs. 0, p = 0.034), bladder injury was more common in the PAS group (8 vs. 0, p = 0.002) (Table 3). One mother died in the UA group.

Discussion

During this study, 180 patients underwent PH out of 237,586 deliveries. The incidence of PH was observed as 0.75 per 1000 deliveries, compared to the incidences reported for the United Kingdom and Italy (0.41 and 2.2 per 1000 deliveries, respectively) [9, 10]. The most common indication for PH in this study was

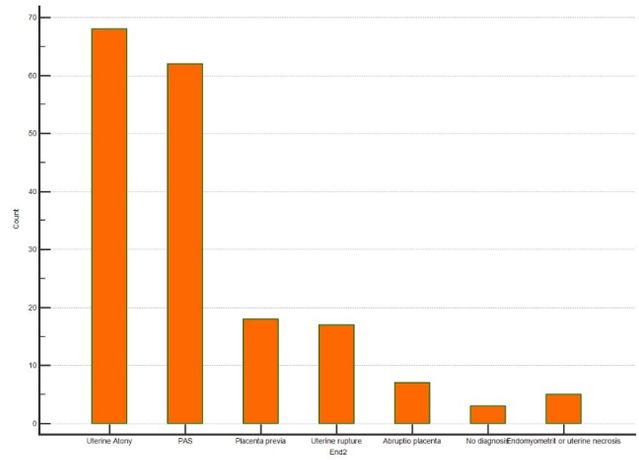

Figure 2. Indications of postpartum hysterectomy patients

Table 1. Comparison of the demographic characteristics of the groups

	UA Group (n=68)	PAS Group (n=59)	P value
Age (years)	33.5±7.2	34.0±5.6	0.704[a]
Gravidity	6 (1-13)	5 (2-11)	0.709[b]
Parity	4 (0-11)	4 (0-10)	0.455[b]
Number of previous CS	0 (0-7)	2 (0-6)	**<0.001[b]**
Gestational age at delivery (week)	39.0 (34.0-41.0)	37.0 (24.0-40.0)	**<0.001[b]**
Nulliparous	6 (8.8)	2 (3.4)	0.209[c]
Grand multiparous	28 (41.2)	18 (30.5)	0.212[c]

PAS, placenta accreta spectrum; CS, cesarean section; RBC, red blood cell.
Data are presented as mean ± standard deviation[a], median (minimum-maxiumum)[b] or n (%)[c].
P-values were obtained by the independent T- test[a], the Mann Whitney U test[b] or the Chi-Square test[c]. Significant p-values are in bold font.

Table 2. Comparison of the perioperative results of the groups

	UA Group (n=68)	PAS Group (n=59)	P value
Pre-operative hemoglobin value (g/dL)	11.1 (2.7-15.1)	10.6 (5.7-14.9)	0.172[a]
Post-operative hemoglobin value (g/dL)	9.3 (3.9-12.6)	9.7 (7.4-13.5)	**0.012[a]**
Duration of operation (min)	75.0 (35.0-215.0)	72.0 (30.0-220.0)	0.270[a]
RBC transfusion	32 (47.1)	28 (47.5)	0.964[b]
Platelet transfusion	11 (16.2)	0 (0.0)	**0.001[b]**
Duration of hospitalization (day)	4 (2-12)	4 (2-19)	0.605[a]
EBLV (ml)	1395 (45-16380)	675 (45-3600)	**0.001[a]**
Excessive blood lossc	29 (42.6)	13 (22.0)	**0.014[b]**

UA, Uterine atony; PAS, Placenta accreata spectrum; RBC, red blood cell; FFP, fresh frozen plasma; EBVL, estimated blood loss volume. Data are presented as median (minimum-maxiumum)[a] or n (%)[b]. P-values were obtained by the Mann Whitney U test[a] or the Chi-Square test[b]. Significant p-values are in bold font. [c]Excessive blood loss, defined as1500 cc hemorrhage or more.

Table 3. Comparison of surgical complication rates of the two groups

	UA Group (n=68)	PAS Group (n=59)	P value
DIC	5 (%7.4)	0	0.034
Relaparatomy	3 (4.4)	1 (1.7)	0.382
Other*	3 (4.4)	2 (3.4)	0.768
Wound infection	1 (1.5)	2 (3.4)	0.478
Bladder injury	0 (0.0)	8 (13.6)	0.002
Maternal death	1 (1.5)	0 (0.0)	0.350
Total	11(16.2)	11 (18.6)	0.714

UA, Uterine atony; PAS, Placenta accreta spectrum; DIC, disseminated intravascular coagulation. P-values were obtained by the Chi-Square Test. Data are presented as n (%)

UA (37.8%), whereas the second most common cause was PAS (32.8%). UA is indicated as the most common cause of PH in underdeveloped countries [3], unlike in developed countries, where PAS is the most common [11, 12]. In this context, there is a difference between eastern and western Turkey. Studies conducted in eastern Turkey are consistent with the data in the least developed countries [6], whereas findings in western Turkey are consistent with those of developed countries [13]. Our findings were consistent with data from less developed countries because the city where our hospital is located is in a less developed part of Turkey.

EBLV and excessive blood loss were significantly higher in the UA group in this study. Additionally, there was no significant difference between preoperative Hgb levels, but the postoperative level was found to be significantly lower in the UA group compared with the PAS group (median 9.3 g/dL vs 9.7 gr/dL, p=0.012). The most important reason for this may be that despite the unpredictable process of UA, PAS patients are managed with clearer boundaries. There are differences in the processes for deciding PH for pregnant women. Patients with UA often experience a prolonged, useless period of conservative treatment before proceeding to laparotomy (or relaparotomy, if caesarean delivery has been performed) and hysterectomy if necessary. The decisions made in this process are often not perfect, and the management of this period among patients is often heterogeneous. Compression suture and uterine or hypogastric artery ligation can be applied to protect the uterus, especially in young patients. Often, if these methods fail, PH becomes the last option [14]. Unlike in PAS patients, coagulopathy, hypovolemia, tissue hypoxia, and hypothermia can be experienced more intensely in UA patients due to this situation [15]. By contrast, in PAS patients, the bladder may adhere to the old hysterotomy line, and the expanded lower uterine segment may make surgical plans difficult. However, patients with PAS often start surgery with an experienced surgical and anaesthesia team and a prior decision on PH. This provides a more predictable process in PAS patients.

Transfusion of blood and blood products is often necessary and life-saving in PH cases. In a recent multicentric study, the need for blood transfusion in PH patients due to UA and PAS was found to be 49.2% and 77.8%, respectively [16]. In a systematic review that included 7001 PAS cases, blood transfusion was required in 46.9% of the patients (95% CI 34.0-59.9) [17]. In our study, 47.1% and 47.5% of the patients in the UA and PAS groups, respectively, received blood transfusions. There was no significant difference between the two groups in terms of need for blood transfusion. However, platelet transfusion was significantly higher in the UA group. Although this was not statistically significant in the UA group, it may be related to the development of more DIC complications. By contrast, EBLV and excessive blood loss were more common in the UA group, and this may increase the need for platelet transfusion. Platelet transfusion need is closely related to the presence of massive blood loss and the development of DIC [18].

The most severe complication of PH is maternal death, and its incidence has been reported as ranging from 0 to 12.5 % [19]. However, high rates of up to 59% have been reported in emergency cases [20]. One maternal death occurred in the patients included in the study (0.78%). This patient was in the UA group. The reason for the low rate may be that the patients in our study group consisted of only UA and PAS patients. However, PAS cases were patients who were operated on under elective conditions, and this may contribute to this result.

Complications, such as postoperative bleeding, wound infection, urinary tract injury, thrombosis-related conditions, DIC, and relaparotomy, may cause maternal morbidity [21]. Emergency procedures are associated with a higher rate of complications than planned procedures [22]. In our study, bladder injury was significantly more common in the PAS group. In PH performed due to PAS, the bladder frequently adheres to the old hysterotomy line, which is an expected result of this situation. DIC was significantly higher in the UA group, which may be related to the adverse effects on hemodynamic and coagulation parameters of the ongoing bleeding during interventions to protect the uterus before a PH decision is made in the UA group. Additionally, the operations of PAS patients are frequently performed by a team that includes experienced anaesthetists and obstetricians. The primary surgeon usually has substantial experience in pelvic surgery and hysterectomy. This allows for much better management of the patient in case of unexpected bleeding.

The most important risk factor for the development of PAS is placenta previa after previous cesarean delivery. In a prospective study in which 723 women with placenta previa gave birth by caesarean section, the frequency of PAS increased with the increasing number of cesarean delivery [23]. In our study, the number of previous cesarean sections was significantly higher in the PAS group.

However, the gestational week at birth was significantly smaller in the PAS group. The optimum gestational age for planned delivery in PAS patients is controversial, and high-quality data are lacking. For stable (no bleeding or preterm labour) patients, the American College of Obstetricians and Gynecologists recommends a planned delivery between 34–35 + 6 weeks [24]. UA often develops after a term birth. The smaller birth weeks of PAS patients are a result of this situation.

The strength of our study is that PH cases emerging from a large birth pool covering a long period were evaluated in a single centre. However, we were limited by the retrospective nature of the study. Another limitation is that we did not classify the PHs as supracervical or total. In one large study, total hysterectomy was associated with more bladder, vein, and ureter injuries and transfusions. Supracervical hysterectomy is associated with higher reoperation and perioperative mortality rates [25]. Further, interventions applied to patients in the UA group before PH are not standard, and this may cause bias.

Conclusion

Although increasing cesarean rates increase PAS incidence, UA remains the most common cause of PH cases. UA cases may create a riskier clinical situation than PAS patients in terms of the amount of bleeding, the need for blood transfusion, and complications that may lead to death due to their unpredictable nature. The elective management of PAS cases with experienced surgical multidisciplinary teams may explain this difference.

Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Funding: *None*

Conflict of interest
None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References
1. Mousa HA, Walkinshaw S. Major postpartum haemorrhage. Curr Opin Obstet Gynecol. 2001;13(6):595-603.
2. Wei Q, Zhang W, Chen M, Zhang L, He G, Liu X. Peripartum hysterectomy in 38 hospitals in China: a population-based study. Arch Gynecol Obstet. 2014;289(3):549-53.
3. Wei Q, Zhang W, Chen M, Zhang L, He G, Liu X. Peripartum hysterectomy in 38 hospitals in China: a population-based study. Arch Gynecol Obstet 2014;289(3)549-53.
4. Abasiattai AM, Umoiyoho AJ, Utuk NM, Inyang-Etoh EC, Asuquo OP. Emergency peripartum hysterectomy in a tertiary hospital in southern Nigeria. Pan Afr Med J. 2013;15(2):60.
5. Zeteroglu S, Ustun Y, Engin-Ustun Y, Sahin G, Kamaci M. Peripartum hysterectomy in a teaching hospital in the eastern region of Turkey. Eur J Obstet Gynecol Reprod Biol. 2005;120(1):57-62.
6. Rauf M, Ebru C, Sevil E, Selim B. Conservative management of post-partum hemorrhage secondary to placenta previa-accreta with hypogastric artery ligation and endo-uterine hemostatic suture. J Obstet Gynaecol Res. 2017;43(2):265-71.
7. Tahaoglu AE, Balsak D, Togrul C, Obut M, Tosun O, Cavus Y, et al. Emergency peripartum hysterectomy: our experience. Ir J Med Sci. 2016;185(4):833-8.
8. Stafford I, Dildy GA, Clark SL, Belfort MA. Visually estimated and calculated blood loss in vaginal and cesarean delivery. Am J Obstet Gynecol. 2008;199(5):519.e1-7.
9. Naef R, Chauhan SP, Chevalier SP, Roberts WE, Meydrech EF, Morrison JC. Prediction of hemorrhage at cesarean delivery. Obstet Gynecol. 1994;83(6):923-6.
10. Flood KM, Said S, Geary M, Robson M, Fitzpatrick C, Malone FD. Changing trends in peripartum hysterectomy over the last 4 decades. Am J Obstet Gynecol. 2009;200(6):632.e1-6.
11. Knight M, Kurinczuk JJ, Spark P, Brocklehurst P. Cesarean delivery and peripartum hysterectomy. Obstet Gynecol. 2008;111(1):97-105.
12. Shamsa A, Harris A, Anpalagan A. Peripartum hysterectomy in a tertiary hospital in Western Sydney. J Obstet Gynaecol. 2015;35(4):350-3.
13. Sahin S, Guzin K, Eroğlu M, Kayabasoglu F, Yaşartekin MS. Emergency peripartum hysterectomy: our 12-year experience. Arch Gynecol Obstet. 2014;289(5):953-8.
14. Lee H-H, Kim T-H. Uterus preservation as an alternative to an emergency hysterectomy for postpartum hemorrhage. Arch Gynecol Obstet. 2014;289(5):929-30.
15. Heitkamp A, Seinstra J, van den Akker T, Vollmer L, Gebhardt S, van Roosmalen J, et al. A district-wide population-based descriptive study of emergency peripartum hysterectomy in a middle-income country. Int J Gynaecol Obstet. 2019;146(1):103-9.
16. Kolin DA, Shakur-Still H, Bello A, Chaudhri R, Bates I, Roberts I. Risk factors for blood transfusion in traumatic and postpartum hemorrhage patients: Analysis of the CRASH-2 and WOMAN trials. Plos One. 2020;15(6):e0233274.
17. Jauniaux E, Bunce C, Grønbeck L, Langhoff-Roos J. Prevalence and main outcomes of placenta accreta spectrum: a systematic review and meta-analysis. Am J Obstet Gynecol. 2019;221(3):208-18.
18. Jiang T, Liu K, Zheng Q, Liao Q. Analysis of Clinical Blood Use in Emergency Blood Loss Patients. Zhongguo Shi Yan Xue Ye Xue Za Zhi. 2019;27(2):613-7.
19. D'Arpe S, Franceschetti S, Corosu R, Palaia I, Di Donato V, Perniola G, et al. Emergency peripartum hysterectomy in a tertiary teaching hospital: a 14-year review. Arch Gynecol Obstet. 2015;291(4):841-7.
20. Jakobsson M, Tapper AM, Colmorn LB, Lindqvist PG, Klungsøyr K, Krebs L, et al. Emergency peripartum hysterectomy: results from the prospective Nordic Obstetric Surveillance Study (NOSS). Acta Obstet Gynecol Scand. 2015;94(7):745-54.
21. van den Akker T, Brobbel C, Dekkers OM, Bloemenkamp KWM. Prevalence, Indications, Risk Indicators, and Outcomes of Emergency Peripartum Hysterectomy Worldwide: A Systematic Review and Meta-analysis. Obstet Gynecol. 2016;128(6):1281-94.
22. Van Den Akker T, Brobbel C, Dekkers OM, Bloemenkamp KW. Prevalence, indications, risk indicators, and outcomes of emergency peripartum hysterectomy worldwide. J Obstet Gynaecol. 2016;128(6):1281-94.
23. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et al. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol. 2006;107(6):1226-32.
24. Obstetricians ACo, Gynecologists, Medicine SfM-F. Obstetric care consensus no. 7: placenta accreta spectrum. Obstet Gynecol. 2018;132(6):e259-75.
25. Wright JD, Devine P, Shah M, Gaddipati S, Lewin SN, Simpson LL, et al. Morbidity and mortality of peripartum hysterectomy. Obstet Gynecol. 2010;115(6):1187-93.

How to cite this article:
Yunus Emre Purut, Fedi Ercan, Mehmet Murat İsikalan, Selcuk Eren Canakci, Niyazi Alper Seyhan, Haydar Kaya. *Contrary to popular belief; Is placenta accreta spectrum more innocent than uterine atony? Ann Clin Anal Med 2022;13(Suppl. 2):S116-120*